

shape

Gurit

The Gurit Magazine N° 16
December 2015

Rejuvenating Ageless Perfection
New Visual Carbon Composite
Roof for Jaguar F-TYPE Bringing
a New Style of DNA to the Water
Turning 200 Tons Over Safely Gurit
Supports Formula S Reusable
Transportation Devices with Attractive
Conditions All Day, All Night



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Putting Gurit Products Closer to Users³⁰

Imprint Gurit Holding AG, Group Communications

Editor in Chief Tanja Moehler, Head of Marketing & Corporate Communications

Contact Thank you for your feedback at shape@gurit.com

Pictures courtesy of Premier Composites Technology (4), Silver Arrows Marine, Mercedes-Benz Style (10, 11), Sergio Peña Miñano (14, 15), Hannah Imlach (22, 23), Rotos 360 Ltd (24-27), Andrea Francolini (28, 30), Grant Wharington (29), Wild Thing Yachting (29).

All other pictures: Gurit Archives

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Dear Reader

The first nine months of 2015 have once again been busy and successful for Gurit, resulting in a pleasing increase in sales by seven percent to CHF 269.2 million. While we continue to improve our operational excellence, to broaden our customer base and to further diversify our business, sales growth and the improvement of our operating profit margin underline the progress that we have been able to achieve.

The business unit Composite Materials benefited from sound demand in the wind energy industry and increased net sales to CHF 205.3 million in the first nine months of 2015. The transformation of our product offering from prepreg towards core material for the wind energy industry, accommodating the technology change in the production of wind blades, is now reflected in growth figures. It is also visible in the favorable position in the global core material value chain for PVC, PET, balsa wood and Gurit Corecell™. Find out more about the use of our core materials in the marine industry and the Gurit PVC brands on pages 8 and 9.

The business unit Composite Components (automotive components, bus parts and structural engineering) achieved net sales of CHF 20.8 million in the first nine months of 2015. As reported earlier, we secured a new supply contract for carbon fiber based automotive body panels at the end of 2014, representing an important milestone in the strategic advancement of our semi-automated automotive parts production. While we have produced and delivered some initial volumes for the new project, the new program has not yet been fully implemented. Ongoing programs, such as the production of a visual carbon roof for the Jaguar F-Type as well as manually manufactured composite parts for super premium cars, underline our dedication to highest quality.

Our Tooling business unit increased net sales to CHF 43.1 million for the first nine months of 2015. Production of wind blade moulds has experienced new record levels this year. At the same time, we have also expanded our offerings of equipment related to wind blade moulds in order to solve the challenges that go along with producing ever-longer wind blades. "Turning 200 tons over safely" is a task that we are able to solve for our global customer base.

This edition of SHAPE is once again dedicated to offer you insight into some of our and our customers' projects. At the same time we intend to provide you with details on the strategic development of Gurit and the milestones and successes we have been able to accomplish on our mission to "deliver the future of composite solutions."

Yours sincerely,
Rudolf Hadorn CEO

Rejuvenating Ageless Perfection

Ever since the late 1920s, the Dragon keelboat has been extremely popular with a wide range of sailors and was even an Olympic class from 1948 to 1972. Further improving a boat that has been optimized and fine-tuned over decades to a state of ageless perfection is certainly a bold challenge to take on. To identify new angles for improvement within the tight, one-design specifications represents an even bigger one but is just the kind of work Gurit is keen on.

When Premier Composites Technology (PCT) decided to breed a new generation of Dragons, they opted for a scientific design process that pretty much resembles that for an America's Cup boat: They brought together an international team comprising highly trained and experienced experts, including Andy Claughton from the Wolfson Unit, Klaus Röder from Carpe Diem as naval architects, and a team of Gurit structural engineers lead by Paolo Manganelli.

Guess work won't do

Paolo Manganelli summarizes the task they jointly tackled:



"PCT's scope was to create a new high-quality and high-performance boat that stands out for speed and its look, yet fully measures as a one-design Dragon." The scientific process started off by testing seven different hull and keel configurations using a velocity prediction program. The two most successful sets were then further refined and optimized. Andy Claughton and his colleagues at the Wolfson Unit were responsible for this process, and they passed on the best candidate hull shape to Klaus Röder, who further refined and faired the design and integrated it with a novel deck design. Gurit was responsible for the entire structural design.

Paolo goes on to explain: "Class rules forbid the use of carbon fiber and epoxy resin for structural components, and they set very specific weight targets for the hull, the deck and the completed boat. With no margin to play with on weight, our task was to allocate every required gram of structure in the most effective way."

Additional stiffness

"We set for ourselves the objective of achieving maximum global and local stiffness. A stiff hull platform carries two principal advantages:

- It allows the crew to carry more forestay tension in heavy weather conditions and, in general, to have better control over the tension of the rigging. This translates into better sail shape control and better performance upwind.
- It bends less under rigging tension and loses less waterline length upwind. Since Dragons operate very much in displacement mode, every millimeter of waterline length gained translates into lower wave resistance for a given speed. Through the use of our detailed finite element model, we were able to quantify the gain in terms of added waterline length over some of the best existing designs and feed the information back to the naval architects.

Within our team, David Olsen used an advanced numerical op-



timization method, based on finite element analysis to maximize the global bending stiffness while meeting hull and deck weights specified by the class rules. The largest gains in global stiffness came from the optimization of the hull and deck laminates, particularly in the aft sections, which tend to contribute the most to bending and twist deflections. We also concentrated our effort on improving the design of the mast step structure and developed novel solutions for the attachments points for the shrouds, forestay and runners. Finally, together with Klaus Röder and the 'Team Premier' sailing squad led by Hendrik Witzmann, we worked hard to achieve a design of the deck and internal structure (bulkheads and cockpit sole) that would offer optimum ergonomics as well as minimum weight and maximum stiffness."

"With respect to the choice of materials, the deck shell, floors and bulkheads of the boat are made with an infused sandwich construction featuring Gurit® 'Corecell™ M' structural foam. The hull is made with a single-skin fiberglass/vinylester-infused

laminate, using carefully selected unbalanced plies.

Gurit has contributed to much more than just the first boat. Six boats have now been built to our designs, and since the launch of the first one, we have improved on many points. In particular, the laminates have been further refined after a load monitoring campaign during the 2015 winter training sessions, and the design of the deck has seen some small adjustments to further improve the efficiency of the sail adjustment systems."

In their first sailing season, the PCT Dragons have delivered an impressive string of results while still relatively "fresh out of the box" (see below). Paolo concludes: "It is really satisfying to see that the choices we have made, together with the design and the sailing team, have brought such outstanding results so promptly. PCT has great ambitions for this project, and we look forward to continuing to work with them and with the Team Premier sailing squad to achieve its full potential."

List of results in the 2015 season:

- 1st at the 2015 XX H.M. King Juan Carlos Trophy (Cascais, Grade 1, 35 entrants)
- 1st and 3rd at the 2015 Italian Championship (Sanremo, 42 entrants)
- 1st and 2nd at the 2015 Douarnenez Grand Prix Guyader (Grade 1, 58 entrants)
- 3rd and 5th at the 2015 Dragon World Cup (La Rochelle, 80 entrants)
- 1st and 2nd at the 2015 Euro-pean Cup (Barstad, 55 entrants)

Back in 1927, Göteborgs Kungl. Segel Sällskap (GKSS Royal Gothenburg Yacht Club) was looking for a boat for younger sailors that was less expensive than the six-, eight- or 12-meter classes. The Norwegian sailor and yacht designer Johan Anker won that design competition with a Bermudan-rigged, sporty keelboat featuring long overhangs and a Spartan cabin. The Dragon, as the boat was soon called, perfectly met GKSS's expectations as it could be sailed from one regatta to the next and proved to be comfortable enough for cruising. The class became very popular for a wide range of sailors across Europe. From 1948 until 1972, the one-design was even crowned an Olympic Class. Today, a large and loyal community of high-profile sailors continues to race these elegant boats.

New Visual Carbon Composite Roof for Jaguar F-TYPE

The F-TYPE, Jaguar's lightweight all-aluminium sports car, now comes with a special customer option: an even lighter carbon composite roof. Weighing only four kilograms – 20% less than the car's standard aluminium roof – this further lowers the F-TYPE's center of gravity, continues to enhance its performance and agility, and provides a unique and attractive visual carbon effect.



Among the many recent innovations across its expanding product range, Jaguar has introduced a carbon composite roof option for its F-TYPE Coupé. Jaguar has developed this new roof in close cooperation with advanced composites development, engineering and manufacturing company Gurit – the world's leading vertically integrated supplier of Class-A composite components to the automotive industry.

The new roof option features an attractive, perfectly aligned carbon fiber twill weave clearly visible through a deep, high-grade lacquered finish. This is the lightest of three roof options: Customers can also choose painted aluminium – itself already lighter than the steel found on almost all car roofs – or panoramic glass.

Ryan Müller, Sales Manager at Gurit says: "By offering this carbon composite roof option, Jaguar brings to the premium car market a technology previously reserved mainly for niche supercars. At Gurit we are thrilled to work with Jaguar to make this happen."

Developing the new roof

The new roof's carbon fiber outer shell and inner panel are bonded together to create a light yet strong and stiff roof structure. The design and materials chosen minimize the risks of oil-canning (deformation and buckling), side-pole intrusion and head injuries during a roll-over. In the all-important roof crush test, more than six tons were applied to each side of the roof. The results were impressive; the carbon fiber laminate suffered re-

markably little damage.

Gurit's parts' crashworthiness and safety modeling, simulation and testing were supplemented by Jaguar's own tests and independent verification by Euro NCAP, the Brussels-based European New Car Assessment Programme. Gurit also ensured that the resin and lacquer used in the roof meet Jaguar's stringent requirements for resistance to yellowing through exposure to ultraviolet light.

Faster, leaner manufacturing

Gurit has invested six million Swiss francs in a new press moulding system enabling industrialized production of larger quantities of composite components for the automotive industry. Used to produce the visual carbon composite roofs, the new press system complements the relatively labor-intensive, multiple-toolset system used for complexly shaped, lower-volume super-premium car parts, which was established several years ago.

The new automated, one-toolset process is much faster – full curing takes less than 15 minutes – and produces less waste. Luke McEwen, Senior Engineer at Gurit's Newport site, says: "By being so efficient, the new press enables us to produce larger composite parts economically. The carbon roof is our first combined structural and cosmetic component and the largest pressed part we have made so far. It's also our first clear coated, non-painted part – so the carbon roof really is a major step forward."

The new roof has received PPAP approval (production part approval process). This is used

in the automotive supply chain to prove that a component supplier has developed a design and production process that meets the client's requirements for series production, which, in the case of the carbon composite roof, started in early 2015.

Carbon composite future

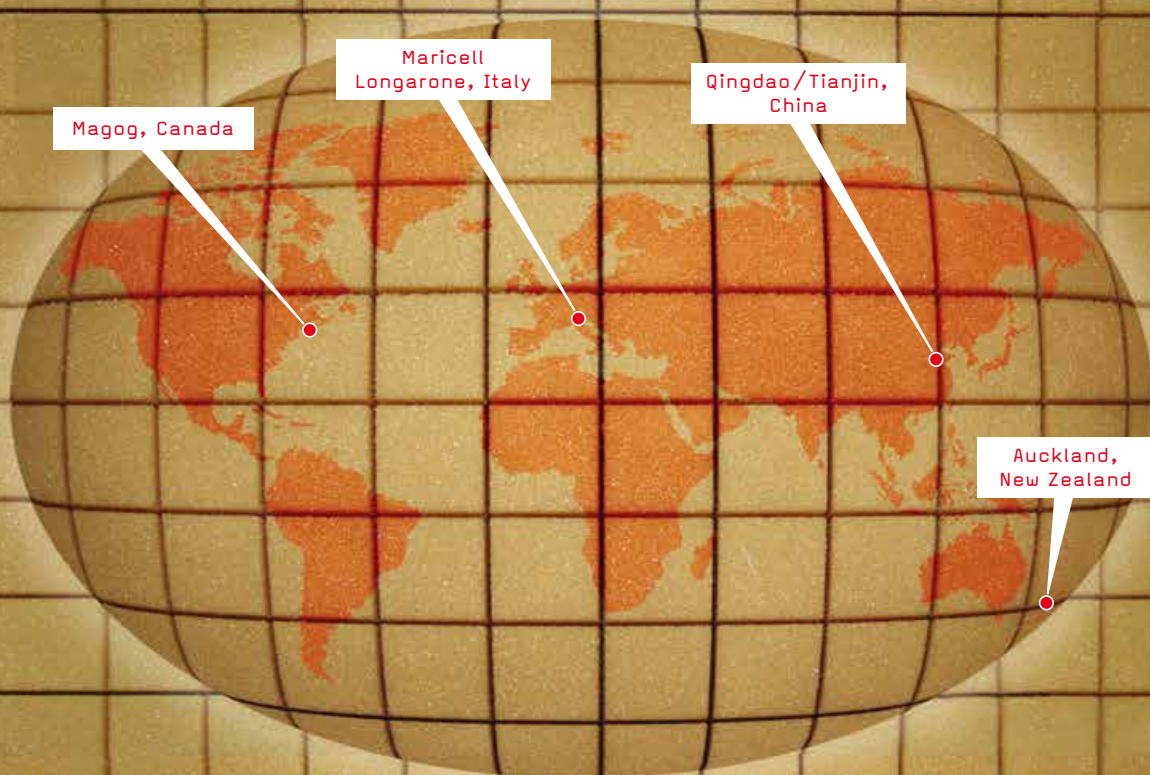
Exuding performance and class, carbon fiber composite beats all other materials in terms of weight, rigidity and durability. In a growing range of applications, it is no longer a hidden structural feature but something car manufacturers and owners want to show.

As the new carbon composite roof demonstrates, improved manufacturing processes, higher productivity and lower costs are bringing more and larger carbon composite visual and structural components to the premium car market.

Gurit continues to supply the majority of Europe's performance car manufacturers and other marques with a wide range of composite fiber parts, and it is proud to include among them the Jaguar F-TYPE with its new carbon composite roof.

Global Availability of Gurit's PVC Brands

Gurit Composite Materials has expanded the worldwide availability of its PVC structural core materials. Gurit-branded PVC core materials are now available across the globe through Gurit® PVC and Gurit® PVCCell™.





Combining its two complementary PVC core ranges, Gurit® PVCCell™ and Gurit® PVC, Gurit has achieved truly global availability of PVC-based structural core materials over the last year. A year after Gurit announced an exclusive distribution agreement for closed cell PVC foam manufactured by the Italian company Maricell, these PVC cores are now globally marketed as Gurit® PVC and Gurit® PVC HT, except for in mainland China and territories. Parallel to this, Gurit® PVCCell™, the PVC-based structural core material, which has been manufactured at Gurit Qingdao in China since 2009, has been under a program of continuous development. This range, first targeted at the wind energy market and widely distributed through the APAC region and India, is now also successfully used for industrial and marine applications.

Strong logistics and ...

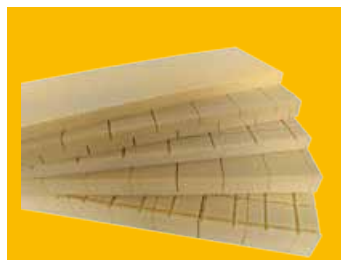
Gurit has built a strong international network with its freight partners

to constantly ensure a high level of product availability and service. Regional stocks at logistically important points guarantee smooth and continuous deliveries: The Gurit sites in Auckland, New Zealand; Magog, Canada and Tianjin, China, as well as Maricell, maintain at all times a minimum level of Gurit® PVC block stock, while Gurit Qingdao closely manages its own production schedule. In addition, Gurit has established the necessary processing capabilities in Magog, Tianjin and Auckland, so that these sites, which also serve as local marketing and logistics coordination hubs for the product range, can flexibly respond to customer demand.

... technical support

Gurit's technical team has developed specific product guidelines for the full PVC range of core materials and is available to support all key customers in their qualification work. In addition to periodical testing of all products, Gurit's techni-

cal team is also continuously developing the Gurit® PVCCell™ range.



Gurit's PVC materials complement the Group's comprehensive core material offerings, which also include Gurit® Balsaflex™, Gurit® Corecell™ and Gurit® G-PET™ materials in a broad variety of densities, finishes and kits.

For more information:

 www.gurit.com/structural-cores.aspx



Bringing a New Style of DNA to the Water

46-foot luxury yacht designed by Mercedes-Benz Style and built on the shores of Lake Geneva

Quite everything about this audaciously different motor yacht is new: Silver Arrows Marine formed a fresh team of marine enthusiasts to challenge convention. The designers of Mercedes-Benz Style have brought the best of automotive Granturismo DNA to the water. The naval architects, engineering and materials partners and the newly formed boat yard Group Carboman SA found new ways of turning a passionate vision into new open-plan, versatile-production boat concept that fulfills every aspect of a future owner's wish list.

The plan was not just to create something yachting had not seen before. The goal was to find timeless answers to future yacht owners' elaborate wish lists. At just 14 meters, the well-performing yacht dubbed Silver Arrow of the Sea offers a unique open-plan concept that brings together the outdoors and indoors seamlessly, transforming the salon into an extended shaded balcony on the water, a luxurious dining room or a stylish master cabin. Voluptuous organic shapes, prime interior materials and a high-tech construction concept make for the truly stunning ARROW460.

Steve Shaw, Senior Design Engineer at Gurit, shares the enthusiasm of everyone involved in this project: "Translating the automotive DNA onto water and making all the fabulous style ideas work involved a lot of innovative engineering." The most promi-

nent structural challenges include the unsupported wide-span roof arch, which evokes the design of the Mercedes S-Class. The side windows can fully be lowered into the curved hull, the front windscreen lifts up so that the salon roof converts into a sunroof, seamlessly expanding the open-plan boat layout into one big luxurious balcony on the water. "Our structural design solution for the uninterrupted arches makes sure the roof is stable, and neither deflects nor stresses the organically shaped windows in any load case. At the same time it offers maximum head room in the salon," Steve says.

The salon also incorporates various features that required some novel structural approaches. "The main idea of the salon is to keep it uncluttered and open. Yet, it should instantly transform into a luxurious dining room or a sumptuous master cabin. The challenges we faced here can best be understood when you look at a rendering of the future interior. Either a table can be pulled out from the solid bulkhead floating without support above the nubuck leather sofas, or the gap between the sofas is bridged by another unsupported pull-out berth instantly creating a comfortable master bed."

Speaking of pull-outs: the large swimming and diving platform that slides out at the aft of the boat also required refined structural modeling to support specific load cases, such as several people standing or simultaneously diving off the platform. When stowed away, the platform absorbs a lot of the space below the open aft. "Space to support the platform was limited, especially as we also needed to provide enough support for the rudder and the propellers," explained Steve.

When the automotive Granturismo DNA is introduced to the water, there is hardly a flat area on the boat hull to be seen. The sides organically emerge in a very fine bow cutting through the waves and are defined by elegantly curved ridges touching the waterline aft. Intensive testing on a 1:1 prototype and Computational Fluid Dynamics CFD calculation helped create the optimal end-shape for the boat. "Not least due to the organic shape and its style-defining features, but also to give future pilots as much ease of mind as possible, we suggested a durable composite materials combination that offers a good balance between robustness and density on the one hand and,



on the other, allows for a certain self-healing deflection when the boat hits, e.g., a floating piece of wood in the water," Steve adds.

There has been an emphasis on producing high-quality, production-friendly parts to ensure that future boats will be assembled in the most time-efficient manner. As the weight of the boat is so critical, there has been consistent effort to save weight wherever possible. A decision was made to manufacture the bathing platform using carbon fiber SPRINT™ ST 94. Being at the aft extremity of the boat, this not only has a positive effect on weight but also on the trim angle, which serves to raise the stern. Overall, the boat is being built using Gurit single-sided SPRINT™ ST 94, both carbon and E-glass. SparPreg™ 600 was chosen for unidirectional reinforcements. A resin-rich layer of laminate is used next to the core to ensure good core adhesion. For bonding components into the boat, hand-made epoxy has been applied using standard double bias 600 gram material. Along with Soric cores, Gurit® Corecell™ M foams in various densities (M80 / M100 / M200) are the chosen structural core materials.

Other areas that received special engineering attention were the motor and anchor departments. Given the slender bow, space again was limited. "The solution here lies in a very strong composite bulkhead, which takes the vertical load from the anchor mechanism and shears it vertically down the inside skin of the topsides. The bulkhead was made as deep as possible in this area to ensure that the load was spread over as large an area as possible, minimizing stress concentrations; therefore additional reinforcement and weight were kept to a minimum. The side load was taken using snug fit plates under the bulkhead

bonding flange, which in turn transferred the load in shear down the vertical bulkhead. Composite solutions also come in handy for the various large hatches like the one covering most of the cockpit floor. It will give lightweight and easy access to the engine room below while maximizing the available space for the engine.

The boat will be made in four main mouldings: the hull, the deck, the interior ceiling and the transom platform. The internal structure is made in separate pieces, but are all made off the boat and as much as possible on a flat table for simplicity and efficiency. These include all the longitudinals, bulkheads and anchor structure.

Silver Arrows Marine's luxury motor yacht is now being built by a world-leading constructor of racing yachts in Switzerland. "With two America's Cups and five Jules Verne Trophies to its credit, Groupe Carboman SA is our perfect constructor," said Silver Arrows Marine Ltd Chairman Ron Gibbs. Groupe Carboman SA is the new name for two of the most respected companies in composite race boat construction, the French firm Multiplast SAS and the Swiss company Décision SA. After several years of collaboration, the companies combined in January 2014 to form this new industrial group. Groupe Carboman Commercial Manager, Bertrand Cardis, says, "It is a great honor and a challenge to build something as unique as ARROW460, but we always thrive when faced with the most ambitious of technical challenges.

"With Groupe Carboman's know-how, quality and attention to detail the Silver Arrow will be truly unique." The collaboration with Groupe Carboman and the specification of a number of Gurit materials for the build form the crucial final piece in the jigsaw for Silver Arrows Marine and its design partner Mercedes-Benz Style. It embodies their long-held desire to bring to market a luxury motor yacht unlike all others. The final exterior and interior designs for the debut model, the 14-meter ARROW460 – Granturismo, were unveiled by Mercedes-Benz Style at the Monaco Yacht Show in September 2013, just one year after presenting initial sketches. ARROW460 is scheduled to be launched in 2015.

Turning Over



As wind turbines become ever larger and more powerful, so too do the moulds used to manufacture the turbine blades. The recent expansion of its production halls has made Gurit Tooling capable of manufacturing moulds of to 100 meters in length. In 2014, the longest mould produced by Gurit almost reached this scale. It was a mould to manufacture blades that were 88 meters long. A truly gigantic tool!



200 Tons Safely



Wind turbine moulds consist of two half-shells which are positioned side by side, so that the composite materials can easily be laid into the halves, where they are also consolidated and cured. Finally, the central spar and the two half-shells are assembled. This requires closing the two halves, so that they can be safely bonded together to create one final blade. To safely turn the upper half of today's long and heavy moulds over and position them precisely over their bottom counterpart, Gurit developed a new, larger series of its proven turnover systems.

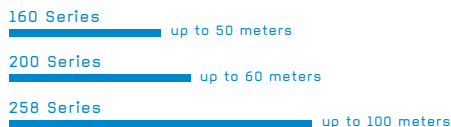
Lu Jialin, Engineering Manager at Gurit Tooling (Taicang), explains: "Over 250 moulds are operated worldwide with Gurit's proven 160 and 200 turnover systems. They are designed to handle blade moulds of up to 75 meters in length. With our new 258 turnover system, we now have the perfect system to safely and precisely operate moulds of over 75 meters, too." The metal arm of a 258 turnover system is twice the size of the smaller 200 series ones and can handle between 15 and 20 tons. "Depending on the length and weight of the mould, five to ten hinge arms of the 258 series can easily handle moulds of over six meters in

height. The torque capacity of each hinge arm is 750 kNm. The closing operation is very smooth and takes only between seven and eleven minutes. A control system oversees the whole operation and makes sure the valuable tool is not twisted in any direction." What is more, the super-slow final closing motion is totally vertical for the last 120 mm, allowing a free floating upper mould for perfect alignment of the two halves.

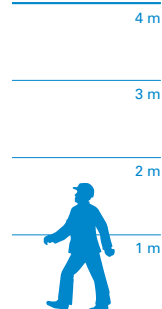
Three turnover systems mastering different mould lengths



Length



Height



Gurit Supports Formula S

Gurit (Spain) supports the Formula Student (FS) campaign of the students of Universitat Politècnica de València (UPV). Organized by SAE International, the Society of Automotive Engineers, FS is a global automobile competition in which student teams from all over the world compete. The current scheme for Europe was developed in 1998 and is run by the Institution of Mechanical Engineers. Backed by industry and high-profile engineers such as Patron Ross Brawn OBE, the competition aims to inspire and develop enterprising and innovative young engineers.

UPV's team consists of 32 students who study engineering design or industrial engineering. They were encouraged to participate by their professor, Juan Antonio Garcia Manrique. After two years of hard work, the team competed in 2014 for the first time in two events: in Germany at Hockenheimring with a crowd of over 20,000 spectators and over 115 teams and at Barcelona's Montmeló course. Each competition is





comprised of a full set of static events (including judging on Design, Cost, Sustainability, Business Presentation, Technical and Safety Scrutineering, as well as Tilt, Brake and Noise tests) and dynamic tests (such as Skid Pad [Figure of 8], Sprint, Acceleration, Endurance, and Fuel Economy).

Best rookie at Hockenheim

At Hockenheim, their car weighing only 223 kg was proclaimed the lightest Spanish car and best rookie on the circuit with 155 teams competing. During the acceleration tests at Hockenheim, the exhaust pipes of their monohull structure built with Gurit materials got very hot, and the team decided not to go on that day. Instead, they went back and further improved their car. On the occasion of the last race of the 2014 season at Montmeló, FSUPV competed from the beginning against the best Italian, German and Spanish teams in all tests. The judges were

surprised by the solid, weight-optimized yet challenging design, because combining the monohull and the aerodynamic package in a first car is not common for a rookie team. Unfortunately, the failure of a rear suspension in the endurance test prevented the team from finishing among the top ten of 51 teams. Regardless, the team is staying fully focused on the next season and already has certain design improvements in mind.

Ending its first season with honors

The Principal of UPV, Francisco Mora, was very pleased with the

success of FSUPV's first racing season: "They have built a great team from nothing. They gained all the necessary technical skills, found sponsors for their project and devoted a lot of hard work. The first year is always the hardest one. They ended it with honors!" Gurit (Spain), who supported the enthusiastic team both with materials and production advice while building the carbon fiber monohull, wishes the team all the best!

For more information:

► www.youtube.com/watch?v=kUoa_xUd_s0

Reusable Transportation Devices with Attractive Conditions

Approximately 75,000 wind turbine blades and 80,000 tower segments were manufactured globally in 2014. This high turnover of components means that wind turbine manufacturers are constantly on the lookout for high-quality, low-cost transportation devices that have short manufacturing times, so that the turbines can reach their destinations safely and on schedule. Gurit has the right answer for this demand.

As wind energy is an ever-growing source for renewable electricity, the numbers of wind turbine blades and towers manufactured are expected to increase over the next five years. In addition, the large majority of these components is shipped to destinations overseas. Considering the length,

bulkiness and value of the various parts that make up a wind turbine, safe transportation is of the essence.



Building on established competencies

Gurit has taken the step to build upon its proven track record of manufacturing high-quality metal products such as turbine blade mould frames, fixtures and turnover systems by expanding its business with a new range of Metal Structure Products (MSP). The Gurit in-house design and manufacturing teams are not only capable of offering racks according to a client's own design but have also developed their own universal design that can be modified to varying blade and tower dimensions.



The manufacturing base for Gurit's Metal Structure Products is in Gurit's Taicang factories in China. Therefore, the MSP business has overriding advantages over its competitors, including short lead times and very competitive material and labor costs. In addition, the Gurit MSPs are currently built to ISO 5817 welding quality, and Gurit aims to develop this further by achieving the overarching manufacturing quality standard EN 1090-1.

Just like the wind turbine components themselves, the transportation devices are exposed to harsh environmental conditions such as strong winds, high salinity and excessive moisture. These factors can be highly detrimental to the transportation racks if left exposed and unmaintained. Gurit's MSPs thus offer a range of possible surface treatments, including galvanizing and painting, so that the devices are robust enough to withstand the environmental chal-

lenges posed throughout their life span.

Assuring reusability

To provide added value to its transportation devices, Gurit plans to offer maintenance and service contracts that will include nondestructive evaluations to check the used transportation devices' integrity. The clear goal is to extend their life span through continued use.

“Well Done, Mate!”

At a gala dinner event late last year, Yachting New Zealand presented Martin Hannon, Design Engineer at Gurit, with an award in recognition of all the work he has put into yacht racing over the last ten years. Yachting New Zealand is the governing body for yacht racing in New Zealand. The organization provides support for developing sailors from junior to elite level and the coaches that guide them through the process.

In his spare time, Martin has been heavily involved in the official measuring and rating of keel boats, both at the national and international level, and the safety of offshore yacht racing events. He also competes in them across the globe. This year, he sailed, e.g., in his tenth Sydney to Hobart race. Normally Martin races on yachts Gurit has had a hand in designing and that use Gurit materials. Martin could, in fact, be thought of as Gurit's unofficial “crash test



dummy.” Out of those ten, he has finished six intact, with the others ending less well: One boat snapped in half (but thankfully did not sink), and three ended with broken masts. Once he had to be lifted off by helicopter, injured along with six others, after a rig collapsed mid-race in a storm. For those who are not familiar with the Sydney to Hobart race, it's considered to be one of the toughest ocean races – both on man and machine. The limits of yacht racing are regularly pushed to their limits at this event.

Data at the Heart of Material Safety

As the demands on composite materials increase with the strict regulations and high-quality standards of the automotive industry, the requirement to understand these complex materials has moved to a new level. Gurit continues to invest in state-of-the-art equipment to increase their expertise and their ability to deliver high-quality composite solutions to this market.

Composite design promises significant benefits to the automotive industry. CO₂ emissions targets drive the industry towards ever more efficient and lightweight solutions. Composites also offer designers greater flexibility and encourage creativity. Gurit's product offerings have increased from components manufactured with our standard CBS materials in open moulds to a new press moulding technology. From structural components to Class-A surfaces and cosmetic carbon finishes, designers now have a multitude of options to deliver components with innovative designs that are lighter, stronger and more cost effective.

Gathering reliable mechanical strength and stiffness data

To design effectively, engineers must be able to predict the properties of composite laminates. Reliable component data is essential at the design phase to evaluate material combinations in computer models before committing to expensive component testing.

The Mechanical Testing Team of Gurit (UK) has been generating such data for customers and engineers alike since 1997. The laboratory – GL-certified for the past 15 years – has seen a steady rise in demand. In 2010, a second shift was implemented. Running an average of over 500 tests per week, the

lab recently celebrated its 50,000th set of samples, which means that at least 300,000 individual tests have been performed. Gurit's increased focus on automotive and motorsport applications has added complexity to testing. Designers are ever more interested in accurate measures of strain, particularly at failure, and performance at higher and higher temperatures.

Minimum and maximum forces define failure behavior

"Being able to characterize ply properties precisely, all the way to final failure in every direction, is crucial to accurately simulating the damage that occurs in



a vehicle crash. In many areas of composite design, structural engineers use the onset of failure as the criterion for acceptable strength. Thus, for material testing, it has been necessary only to know the strain in the laminate at the moment when cracking starts. Mechanical extensometers have previously proven adequate for this purpose.

“For crash simulation, however, it is important to know not just the minimum but also the maximum force a structure will withstand when it breaks. If part of a car body is too strong it will not fail in a controlled manner, absorbing energy, but instead it will transmit unacceptably high forces to the rest of the structure. This can cause damage to the passenger safety cell, or increase the very high G-forces experienced by pedestrians and occupants in a crash. Most of the energy is absorbed in the final stages of breakdown of the material. Thus it is necessary for engineers designing safe vehicles to understand the failure behavior of the material right through from initial cracking to complete destruction,” explains Luke McEwen, Senior Engineer at Gurit (UK).

Traditional techniques for measuring displacement utilize clip-on extensometers or strain gauges glued to the specimen. Extensometers are quick and easy to use but must be removed from the specimen before failure to avoid damage. Strain gauges can be taken to failure but are expensive and resource limiting as each specimen needs at least two gauges accurately glued in place. Both methods are also limited by temperature. To solve issues of strain measurement and high-temperature testing and to fulfill growing capacity demands, Gurit has recently invested in a non-contact extensometer technology. This is ideal to balance the modern-day requirements of high throughputs with very accurate measurements of strain all the way to failure. Typical non-contact extensometers use optical systems with complicated image analysis algorithms that monitor changes in a speckled pattern on the surface of the specimen. Generally, this speckled pattern is introduced by spraying the surface of the coupon with a combination of black and white paint. However, the system chosen by Gurit utilizes a combination of a projected laser pattern with an optical system to negate the need for sample preparation.

Crash simulation with non-contact optical extensometers

Using a Zwick LaserXtens system, the specimen is illuminated with laser light, which generates a speckle pattern on the surface. When the specimen is subjected to a load, the virtual gauge marks are displaced and the evaluation windows are updated. LaserXtens calculates the strain on the specimen from the displacement between two consecutively recorded images. A backlight provides a second image of the specimen in silhouette; this image is used to measure the change in width of the specimen throughout the test to failure, which allows for accurate measurement of Poissons ratio and in-plane shear strains. This one system maintains the required high throughput and enables measurement of multiple batches quickly and efficiently to give statistical confidence for data modeling.

“We can easily establish the full stress-strain relationship of each ply material right up to final failure of the laminate. Furthermore, as the strains can be measured in multiple directions simultaneously, we gain insight into how the Poisson’s ratio and shear





modulus change at very high levels of strain. Curiously, although carbon fibers are strongest in tension, it is the resin-dominated failure modes in compression and shear that are key to determining the energy absorbed in a crash, as the material then exhibits a ductile behavior analogous to the yielding of a metal. The optical extensometer can measure in-plane shear stiffness and strength far more accurately than has been possible with mechanical extensometers, right through that yielding process,” Luke summarizes the advantages of the new testing tool. Put more simply, with the capability to characterize the full destruction behavior of all the different composite materials used in vehicle bodies, Gurit can now simulate the consequences of a crash with greater confidence and accuracy, improving the safety of the vehicles fitted with Gurit composite components.

High-temperature testing up to 300°C

High-temperature testing has also been increased from a maximum of 150°C to 250°C, with a future potential of 300°C. The design of the test chamber

and LaserXtens system is such that non-contact strain capability is maintained even at these high temperatures. The new Zwick Red Z250 Test Frame increases load capability from 100 to 150 kN, and a new set of screw and wedge grips will eliminate specimen slippage. This setup again significantly increases Gurit’s technical capability and capacity.

Dimensional stability and Class-A surface finish

Mechanical testing allows Gurit to model and design the lightweight components of the future. In reality, however, pure strength and stiffness are not the only issues when designing composite components. Unlike metals, composites are anisotropic materials having different properties in different directions due to the orientation of the fibers, types of fiber (glass/carbon) and the weave of the fabrics. Therefore, they also expand and contract at different rates when exposed to varying temperature both in service and during manufacture. The situation is further complicated by the presence of the resin matrix that binds the fibers together and transfers the loads between the fibers. The matrix has its own expansion co-efficient, which is significantly different from that of the fibers. Furthermore, the matrix behaves differently during the manufacturing process. When curing, it undergoes a change of state from a liquid to a solid and this induces volumetric shrinkage. Producing a body panel with the required engineering strength and stiffness, featuring a class-A surface finish while avoiding panel distortion, is a significant challenge.

What about CTE?

The functionality of a bi-metallic strip takes advantage of a mismatch in Coefficients of Thermal Expansion (CTE). Without this, our kettles would not know when to turn off. This type of distortion has its applications but is generally not desirable, particularly not in car body panels that have exacting dimensional tolerances, and yet, the materials used in these composite laminates are highly anisotropic. Carbon fiber has an extremely low CTE, while epoxy resins and glass fibers are orders of magnitude higher.

Balancing a laminate to avoid distortion is critical but in some cases just impossible – in these cases tooling is deliberately manufactured outside of the part dimension to account for the known distortion

behavior on release. The measurement of CTE and dimensional stability is therefore another critical property in designing laminate structures. The Materials Testing facility in Newport has acquired a TA Instrument Q400M Thermo-mechanical Analyser (TMA) for measuring CTE and displacement.

A TMA instrument consists of an oven enclosing a sample plinth on which a small sample is placed. A probe capable of measuring deflection to 15 nm (about 1000 times thinner than a human hair) sits in contact with the top surface of the sample. These internal components are all manufactured precisely from quartz, as it has a low CTE. The sample is then heated and the corresponding deflection measured. CTE is generally quoted as the amount of deflection in microns per meter per degree of temperature.

To make things complicated, thermosets have more than one CTE. At the glass transition temperature (T_g), cured thermosets rapidly change from a glass state to a rubbery one. Above the T_g , molecules in the thermoset become more mobile. They do not melt because they are bound together, but the additional free volume allows the polymer chains to rotate around themselves. This additional molecular movement translates into more expansion and a higher CTE. A single scan in the TMA can determine T_g as well as the CTE before and after this event.

Resolving overlaying, reversible and nonreversible phenomena

Simple? – well not really. Epoxies are thermosets, and thermosets undergo another important dimensional change – cure shrinkage. The distance between unreacted molecules is greater than the length of the bond between reacted molecules. On reaction, the molecules are drawn closer together, and there is a corresponding reduction in volume.

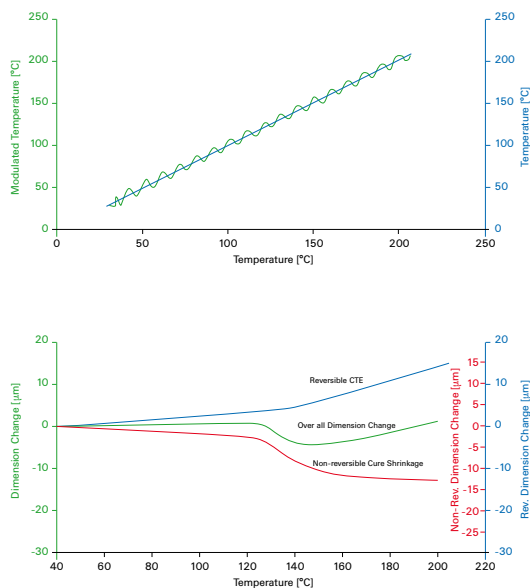
Fully curing an epoxy laminate often requires additional post-cure at relatively high temperatures. It is not uncommon for there to be residual cure reactivity left available in a sample. This residual cure would manifest itself in the TMA trace as a shrinkage event. In reality, because there are conflicting effects of thermal expansion and cure shrinkage, all occurring around the point of a change in CTE due to the glass transition temperature, it is as it sounds – complicated.

Thankfully the “M” in Q400M can resolve this complication. M stands for “modulated” and it is this modulation that allows us to resolve these overlaying events. Simply put, modulation separates reversible from non-reversible events.

CTE is a reversible event – if we heat, cool and reheate a specimen it will expand, contract and expand again. T_g is also a reversible event – cycle a material above and below the glass transition temperature and it will correspondingly become rubbery, glassy and then rubbery again. Cure shrinkage is non-reversible – once the curing reaction and shrinkage have occurred they cannot happen again.

In a modulated TMA experiment, we heat the material through a normal dynamic scan, for example from 25°C to 200°C at 1°C/min, but we overlay a +/- 5°C temperature modulation on top of the underlying ramp rate. This modulation is able to capture the events that are reversible from those that are non-reversible, and hence the two can then be separated.

The results are displayed as three curves: Overall Dimension Change, Reversible CTE and T_g , and Non-reversible Cure Shrinkage. Understanding these material phenomena is crucial in the understanding of the behavior of the materials on a macroscopic and component scale during the manufacturing process.



Evolution Travelling Back in Time

State-of-the-art Gurit materials were used to create a site-specific sculpture that takes spectators back to the time when the Scottish coast was covered by tropical forest.

Eons ago, the Scottish coastline of East Lothian was covered by tropical forest. Ancient *Lepidodendron* trees reached up some 30 meters into presumably a misty sky. These organisms are long gone, but they left strikingly round rootball depressions in the limestone, spurring an imaginary lush vision of how this place may have looked. Scottish artist Hannah Imlach researched the site, its history and nature in the context of a research residency and con-

ference with North Lights Arts in Dunbar. Her artistic practice is concerned with our engagement with the landscape and natural elements and often incorporates visions of past and/or future landscape scenarios. She is interested in heightening our sensory experiences through the creation of site-specific and transient sculptures. For these reasons the amazingly preserved geological landscape, between Whitesands Beach and Barns Ness



“I created the sculpture to provide a fleeting ancestral meeting point for the descendant of the *Lepidodendron*, which floated in the space the giant tree once inhabited.”

Lighthouse, was of particular interest: “The landscape conveys the process of its formation, and ideas of deep time are inescapable”. Her site-specific sculpture Hexagonal Island Host was developed with the contributions of geologist Fiona McGibbon, Robert Blackhall-Miles of Fossil Plants and Gurit as the supplier of balsa wood and Epoxy resins.

“My sculpture sits in a rock-bowl presumably formed by the rootball of an ancient *Lepidodendron*. The fossilized remains of these giant mangrove-like trees can be found across this stretch of coastline along with a host of others, including Brachiopods, Crinoids, Corals and Trilobites.”

Hannah’s research focused on the scale of time and landscape, which connects us to these organisms, and the botanical future of the *Lepidodendron*.

“I discovered that the only living descendant of the Scale Tree is a small freshwater plant called Lake Quillwort or *Isoetes Lacustris*, commonly found in mountain lochs in places such as South Uist. Over 20 million years this species has changed in almost every way from the imposing tree that created this dramatic landscape.

As a point of connection to encourage geological enquiry and exploration, I created the sculpture to provide a fleeting ancestral meeting point for the descendant of the *Lepidodendron*, which floated in the space the giant tree once inhabited. The floating balsa wood form acted like a cross-section of trunk, its articulated components moving across the surface of the water. Protectively held within the sculpture, multiple young Quillwort plants grew within a small pouch of freshwater.”

Hannah was also investigating various materials to build her sculpture: “The sculpture was made of 24 equilateral triangular components hinged together to form a hexagon. I was impressed by the range of buoyant composite material samples offered by Gurit and the sculptural possibilities they held. Working as an individual it can be difficult to gain access to such specialist materials”

Martin Armstrong of Gurit (UK) offered Hannah some technical advice. “Working with artists is always interesting as they have completely different priorities to those of the engineers, artisans, and distributors I normally work with. It also takes more time as the artists commonly do not have a

fixed idea of what the final product will be and are thus more likely to consider the characteristics of the material or medium they work with or the process they are about to apply. Artists commonly have little or no experience with composites, and they lack the specific vocabulary, which can slow the process but also allows a greater exchange of ideas as I explain options and restrictions they first thought would be easy and we work toward their goal. But this also works in reverse when they discover that a process that they thought would be time consuming and difficult is actually easy when using the correct composite material or process.”

“Hannah had a clear idea of the scale and shape of her sculpture and the way she wanted it to move on the surface of the water as it is undulated by the wind and tide. So it was up to me to just ask the right questions to picture not just the scale but also the feel of the sculpture. First we looked into structural core materials. When I told Hannah that Gurit not only manufactures foam cores but also offers end-grain balsa, the discussions took a different direction: The visual grain structure of balsa was the perfect idea match for this piece (evoking the trunk of the ancient tree), its meaning and its intended location. When Hannah went for balsa wood, I then suggested the right materials that would seal the wood from water ingress, safeguard it from impacts during transportation and installation and also protect it on site.”

For more information:

 www.hannahimlach.com

All Day, All Night

Wind turbine blade service company Rotos 360 is using Gurit's RENUVO™ UV-cure repair system to reduce the cost of blade maintenance, delivering significant savings in the cost of offshore wind. Thanks to the expanded temperature application range of RENUVO™, work goes on round the clock.

However well-built they are, the blades on all wind turbines suffer erosion of the blade leading edge, due to the cumulative effect of years of impact with rain drops, ice and airborne particles. Each individual impact is tiny, but over the years, countless collisions wear away at the surface, exposing the underlying composite.

This erosion creates an irregular surface that disrupts the smooth airflow over the blade, reducing the power produced by the turbine. Once it starts, the damage accumulates at an accelerating rate. If unchecked, the erosion allows water ingress and causes ice damage and ultimately structural failure.

The only way to fix the erosion is to grind away the damaged surface material before it gets too severe and repair it with filler. Provided it is caught in time, the blade can be returned almost to an as-new condition within a matter of hours.

Suspended access platforms

One significant challenge is the question of how to access the blades on offshore turbines in order to carry out this essential repair work.

Bringing in a jack-up crane barge to remove the blade to take it to a repair yard is exceedingly costly, but this may be the only option if damage has progressed to the point where the structural integrity of the blade is uncertain. Another approach is for rope-access workers to rappel down the blade from the nacelle. This is skilled and arduous work. The scope of work that is possible is inherently limited, as is the use of power tools, and quality control can be difficult.

For onshore turbines, suspended access platforms have been developed. These work on the same principle as window cleaners' cradles. The platform uses electric winches to climb up steel cables that are attached in the nacelle. However, until last year, no one had successfully deployed and used suspended access platforms on offshore turbines.

Rotos 360, supported by a grant from the UK government's Technology Strategy Board, and working with the platform manufacturer Käufer GmbH, successfully demonstrated the effective and safe use of suspended access platforms deployed from the deck of a service vessel to offshore wind turbines. Last summer, Rotos 360 undertook a program of blade inspection and repair work, using the system for an offshore windfarm operator.

Wide temperature window and rapid UV-curing

A crucial element in the repairs was the use of Gurit's RENUVO™ UV-cure blade repair system, with RENUVO™ MPS paste and prepreps instead of old-style wet lamination. RENUVO™ materials are easy to handle, and require no mixing or hand impregnation. A new hand-



held 8 W/cm sq UV lamp package was developed using a Phoseon Firefly air-cooled, solid-state LED lamp in a shock resistant case, specifically for use from the platforms.

The rapid curing afforded by the ultra violet lamp allows the repair to be cured reliably in minutes, rather than the hours required for the old two-part systems. This allows the repair workers to move on immediately to the next area. The repairs can be completed and the turbine returned to service more quickly, reducing downtime and increasing the power produced. Meanwhile the repair team can move on to the next turbine, maximizing utilization of repair assets, including the platform and support vessel.

RENUVO™, with its 5 to 30°C application temperature range and up to 90% relative humidity tolerance, can be used at lower temperatures than many other systems, extending the weather window for repairs into the cooler temperatures of spring and autumn without the need for additional heating.

Working under floodlights fitted onto the platforms, repair teams are even able to work in shifts throughout the night when temperatures are cooler. This maximizes the productivity and asset utilization of the repair teams and takes full advantage of tight weather windows.

The platform takes about two hours to set up, from arrival of the repair vessel to starting the first inspections and repairs. Work then continues 24 hours a day in two 12-hour shifts until all three blades on the turbine have been inspected and repaired; then the platform is recovered to the deck of the vessel and the team moves on to the next turbine.

Rotos 360 has achieved DNV-GL certification for repair of offshore wind turbine blades using Renuvo. All aspects of the repair are covered, from the storage and handling of materials, proper preparation of the repair, application and curing of the patches, to finally sanding and painting the repair. Each stage has a quality control process, with data being recorded and

Days Offshore



photographs being taken. Repair technicians undergo special training for RENUVO™ repairs and in the proper use of the suspended access platform.

Rotos 360 now has a fully developed turnkey offshore wind turbine blade inspection and repair process that uses RENUVO™ repair materials. Up to four platforms and eight repair teams can be deployed from each vessel. This inspection and repair process based on RENUVO™ optimizes the use of the precious time of an offshore campaign increasing productivity and reducing costs.

For more information:

 www.rotos360.co.uk

A normal day starts at 6:30 a.m. with a toolbox talk highlighting the day's repair activities and safety issues. The vessel moves into the turbine holding position with Digital Positioning and the giro-stabilized "Amplemann walk" to work transfer system is deployed to the turbine. At 7:00 the nighttime repair team transfers back to the ship, and after a short briefing from them the day shift transfers over. All safety checks are then performed and the checklist for tools and materials conducted. Blade inspections are started from the tip of the blades, and any damage is recorded. The repair of this damage is started straight away. Gel coat cracks are ground out and filled with RENUVO™ MPS paste and cured in seconds. Larger damage in the laminate is ground out, and the size of patch is radioed down to the ground – or rather vessel – crew who cuts out the repair patches then preconsolidates them under heat and vacuum. The patch is then collected by the repair team, applied and cured. The curing takes only a few minutes, and the repair can then be sanded and painted straight away; it does not require any post-cure. Once finished the platform moves up to the next damaged area, and the process starts again. When one blade is completed, the platform is lowered down and secured so the blades can be released and rotated round to the next blade, which is then secured so work can start again on its tip. The inspection continues until 7:00 p.m. when the vessel moves in again, ready to recover the day shift and send the night shift over. The inspection and repair process will take a few days for the complete turbine. The platform will then be recovered to the deck of the vessel and moved to the next turbine.



SUPER-MAXIS

UNDER THE KNIFE

In their quest to win line honors and compete with the advantages of the very latest technology, many Super-Maxis including Wild Oats XI, Lahana, and Ragamuffin 100 to name a few, are undergoing or have undergone reconstructive surgery using Gurit's composite solutions to improve their strength, weight and performance.

Wild Oats XI

With just a single constraint of keeping their length to 30.48 meters/100 ft, (applying only to the annual Sydney to Hobart Race), the rules the super maxis race under permit experimental technology such as rotating wing masts, tight luffed code-zero type sails,

water ballast, canting keels, DSS foil, daggerboards, retractable propulsion systems, and asymmetric spinnakers. The use of lightweight composite materials, such as standard and high modulus carbon fiber and epoxy resins, are utilized in all of these.

Since its launch and momen-

tous record-breaking win in the 2005 Rolex Sydney Hobart, Bob Oatley's 30.48-meter Super-Maxi Wild Oats XI has been repeatedly modified with a significant involvement from McConaghy Boats. Designed by Reichel Pugh Yacht Design Inc., it originally featured DynaYacht's patented Canting Bal-



last Twin Foil CBTF technology, allowing it to carry a massive sail area without compromising on stability. Gurit's Engineering team provided the detailed design and analysis for the vessel's composite structure and met the structural requirements of this original design by specifying its SE 84 carbon prepreg combined with Nomex cores throughout, to achieve an all up displacement (weight) of 30.6 tons.

Bob Oatley's next step was to fit Wild Oats XI with a Dynamic Stability System (DSS) foil in a bid to improve the yacht's ability to surf when sailing downwind in strong winds. With its foils, a retractable forward rudder, two retractable daggerboards, the canting keel, and the conventional rudder at the stern, it is often now referred to as to looking like a Swiss Army Knife.

The next refinement to Wild Oats XI design occurred following its record matching 7th Line Honour Victory at the 2013 Sydney Hobart, in preparation for the 2014 Sydney to Hobart Race and new challengers. These refinements included the reshaping of the stem into a sharper form using Gurit's core and reinforcement materials.

While having surgery to the stem, the bulky PBO (polybenzoxazole) bobstay, which extends from the tip of the bowsprit to the bottom of the stem, was replaced by a slender solid tension strap made from Gurit's SE 84 carbon prepreg system, which was also used in the reshaping of the stem by the team at McConaghy Boats.

Following Wild Oats XI's Line Honour Victory in the 2014 Rolex Sydney Hobart Race and again at the 2015 Transpac and the prospect of new and fresh challenges for its dominance in the Sydney to Hobart yacht race this year, it is having its most significant upgrade yet. It has returned to McConaghy Boats and having 10 meters cut off the bow and 2 meters cut off the stern. A new transom will be fitted where the stern has been cut off. Simultaneously, a completely new 12 meter bow section will be added to maintain its overall length.

Much of the design work for the new-look Wild Oats XI has been done by the original designers, Reichel-Pugh, based in California, USA. By extending the bow forward, the yacht will have considerably more buoyancy, a feature which all design testing indicates



will make it considerably faster. It will also be lighter.

It is scheduled for re-launching in early December 2015 in preparation to defend its title in the 2015 Sydney to Hobart Race.

Lahana/Rio 100

Designed and built in New Zealand with structural engineering services from Gurit, it started life in 2003 as Zana, then becoming Konica Minolta, followed by Lahana and has been born again as Rio 100. Initially a relatively small boat by Super-Maxi standards, due to IRC rule limits, Lahana had long overhangs and a smallish rig. It raced just with a conventional ballast keel, although it was built with water ballast installed. After coming agonizingly close to winning in both 2003 and 2004 it competed in the 2010, 2011, and 2012 Sydney to Hobart Races with a number of thirds and fourths, but was never able to match the longer, more powerful canting keel maxis. Then in 2013, Lahana was





sold to a new owner from California and has recently undergone a major refit for a new life of very different racing on the US West Coast. Now named Rio 100, it was chosen because it does not have a canting keel. Instead it relies on a fully manual winch system. The focus of the changes to the yacht have been to turn it into a yacht optimized for VMG (Velocity Made Good) running in light to moderate conditions, as expected in the Transpacific Yacht Race and US West Coast races.

To meet its new focus, the boat has been cut in half and about 18 meters of the stern have been cut off and discarded, and a new stern has been grafted onto the original bow section, making it longer at 30.48 meters and wider, with maximum beam now being carried right back to the transom. The canoe body profile has been straightened out and it now has no aft overhang to maximize its effective length. The bow profile has been made more plumb from the original raked profile, and the original keel has been replaced with a deeper fin and lighter bulb, which is more optimized for downwind sailing. The water ballast has been

removed, and it now sports twin rudders, a longer bowsprit, longer boom, and significantly more sail – all this combined with an eight-ton reduction in sailing displacement.

Rio 100 has been redesigned and reconfigured by its original New Zealand designer Brett Bakewell-White. The main structural consideration was to ensure that the new structure was compatible with the original remaining structure and materials, which meant that building methods and material choices were to some degree dictated by the original design and build. Cookson Boats in Auckland, who carried out the refit, worked closely with Gurit to get the best possible match in material properties and products for a relatively tight building program. These include the multi-axial carbon fiber fabrics XC 411 and RC 200T, and double bias products including Gurit's SE 70 hot melt, low temperature cure, epoxy prepreg system, SA 70 toughened epoxy adhesive film and Nomex core material.

Rio 100 succeeded and recently won the Barn Door Trophy in the 2015 Transpac.

Putting Gurit Products Closer to Users

As more industries discover the advantages of composites for a growing range of applications, Gurit is expanding its distributor network across the European, Middle Eastern and African markets.

"Traditionally, we have strong ties with distributors targeting the boat building and marine market," Yannick LeMorvan, Gurit Composite Materials Sales Manager France & North Africa, explains. "We are currently establishing new ties with other distributors who have interesting contacts into further industries or who cover countries where we haven't been very active so far." Gurit is fast growing its footprint in key EMEA composite markets through a growing number of distributors. "We are adding distributors who are, e.g., specialists in the oil and gas, health care and other industrial sectors, such as the automotive or rail industry. We are seeking to put the Gurit brand at the top of everyone's mind, across this vast and diverse market area. If anyone thinks composite, they should immediately think of Gurit!" So, wherever

someone uses or considers composites, there should be a well-informed, competent local specialist close by. Ideally, the distributors are keeping a certain stock of key products to serve their new customers in a very timely manner. "Keeping our customers stocked makes a great difference in terms of local responsiveness and visibility. We value their service a lot and support them in whatever way we can, as they are the ones who regularly deal with many of our valued customers."


The distributors pool their orders for Gurit materials, which increases the average order size and thus makes production more efficient. At a two-day seminar in November in Amsterdam, Gurit provided insight on its strategic vision, and brand offering and created awareness for several new products. Furthermore, the Company offers Technical Training Programs, drilling down the different product groups. These programs are aimed at helping our partners to better respond to market needs.



Authorized Gurit distribution partners also enjoy a privileged extranet access to a lot of information on Gurit products and the best suited application technologies. Regular newsletters keep them updated, too. "The best way to learn about Gurit products, however, is by joining one of the regular technical workshops," says Martin Armstrong, who is a key contact to Gurit's distributor network at Gurit (UK).

So, if you are looking for some specific Gurit composite materials, or if you want to discover the advantages of our advanced products, please consult www.gurit.com/sales-and-distributors.aspx to locate the specialized distributor closest to you.

For more information:

 www.gurit.com/sales-and-distributors.aspx





Thurgauerstrasse 54
CH-8050 Zurich
Switzerland
www.gurit.com